Date: January 13, 2008
Attention: 2010 Dietary Guidelines Advisory Committee
From: Elizabeth Klein, BS, MPH candidate
Re: Adding Sleep and Relaxation Language to the *2010 Dietary Guidelines for Americans*

The *Dietary Guidelines for Americans 2005* lacks specific language that promotes the incorporation of an adequate amount of sleep and relaxation into an average daily routine.[1] As a public health professional, I propose that the Dietary Guidelines Advisory Committee (DGAC) integrate such language throughout the seventh edition of the *Dietary Guidelines* as well as include a full chapter in addition to a reference in *Mypyramid*. Lifestyle-related diseases such as obesity, hypertension and type 2 diabetes are increasingly growing epidemics in the United States.[1] Lifestyle habits such as sleep deprivation and high stress contribute to the rise of these diseases and addressing such habits in the *2010 Dietary Guidelines* would help in the awareness of how to prevent of such diseases.[2]

Traditionally, healthy lifestyle factors including proper diet and physical activity are encouraged in the prevention of nutrition-related non-communicable diseases (NRNCD) such as type 2 diabetes and obesity, which was reflected in the 2005 *Dietary Guidelines.*[1,2] The *2005 Dietary Guidelines* emphasized physical activity more so than in the past, with a full chapter devoted to this subject. However, adequate sleep and low stress are lifestyle factors that are of equal importance to both diet and exercise, not just in prevention of NRNCD's, but also essential in maintaining a healthy metabolism.

Providing a full chapter for sleep and relaxation would make certain that all of the elements of sleep and relaxation are covered, beginning with recommendations of the amount of sleep necessary for an individual, especially for particular age groups and special populations. The chapter should incorporate suggestions and techniques on how to develop and maintain healthy sleeping habits including eating habits such as avoiding too much caffeine in afternoon hours and avoiding late night meals. The chapter can provide stress reduction methods and relaxation tips. A section in this chapter should also describe the negative effects that lack of sleep and high levels of anxiety has on the body including the rise of lifestyle diseases, specifically those related to poor eating habits.

Individuals affected by sleep deprivation and high stress lifestyles have increased over the past twenty years, affecting up to 70 million Americans.[3] In 2005, nearly 40 percent of adult Americans self-reported receiving less than 7 hours a night of sleep daily.[4] Additionally, problems associated with sleep deprivation has burdened the health care system financially, with treatment costs for health issues associated to sleep deprivation reaching billions of dollars.[3] Lack of sleep and high stress lifestyles affect the body both physically and psychologically. Such effects can be quite reciprocal, complex and self-perpetuating. The *2005 Dietary Guidelines* touch upon a few physical stressors including smoking and alcohol abuse but fail to mention the relationship negative psychological stressors have with health especially nutritional choices.[1] Not only does sleep deprivation and anxiety lower the body's immune system and make it more susceptible to communicable diseases but it has been directly linked to NRNCDS.[2,3,4]

Sleep deprivation has a direct relationship with NRNCDS because it causes hormonal imbalances which affect metabolic function. Studies that focus on night shifts for example have

found that night shift workers have higher BMIs, higher insulin resistance and secrete larger amounts of daily cortisol as well as present lower levels of melatonin.[5,6] Melatonin is known to have a link to fat metabolism.[6] There is a general consensus among the literature that sleep deprivation is linked to NRNCDS via three main mechanisms including appetite upregulation, change in glucose metabolism, and decreased energy expenditure.[2,5] A 2004 study for example, conducted at the University of Chicago by Researcher Spiegel and colleagues demonstrated how sleep deprivation disrupts the levels of hormones that regulate hunger including leptin and ghrelin.[7] Laboratory as well as field research supports the 2004 study in that sleep deprivation results in excessive appetite increase associated with a high calorie dense food preference.[2,7] Emphasizing the effects of sleep deprivation on behaviors that influence caloric intake would significantly contribute to preventative efforts already established in the Dietary Guidelines.[4]

Research indicates that chronic sleep deprivation can lead to impaired glucose metabolism.[2,4] Impaired glucose metabolism or more specifically, impaired glucose tolerance, involves the inability to properly metabolize glucose and return to a baseline amount of glucose in the blood. Glucose metabolism depends on several interrelated mechanisms in the body including the role of insulin.[2] In healthy individuals, glucose tolerance fluctuates throughout the day and decreases when the body sleeps at night. The body undergoes a variety of mechanisms to maintain stable glucose levels, and because the body is fasting during the sleep state, these mechanisms change when the body is asleep and are especially sensitive to the sleep cycles[2]. Sleep deprivation would alter these mechanisms significantly. Laboratory studies have shown that sleep deprivation alters glucose metabolism as well as alter the levels of thyroid stimulating hormones (TSH) that regulate metabolic function as a whole.[2] Impairment to glucose metabolism coupled with impaired metabolic function can lead to an array of health concerns including weight gain as well as a path towards becoming insulin resistant and ultimately developing type 2 diabetes.[2,4,8] Weight gain can lead to other problems including hypertension.

Although more research is needed, current research suggests that sleep deprivation could affect energy expenditure.[2] Individuals with irregular sleep patterns often report a decrease in energy expenditure and lack of physical activity.[2] In recent years, the *Dietary Guidelines* along with the *Mypyramid* have increasingly put more emphasis on the importance of physical fitness as an integral part of an "energy balance." The Dietary Guidelines Advisroy Committee (DGAC) 2005 report indicates that this increase in emphasis of physical activity is due to the alarming increase of obesity among adults and children.[9] The dietary guidelines emphasizes that the average American needs to prevent lifestyle diseases such as obesity and hypertension with exercise. [1,9] The DGAC needs to acknowledge that this energy balance is threefold, not only including diet and physical fitness, but also including sleep and relaxation. A physically fit body needs sleep in order to rejuvenate itself. The results from an Italian study on female young adults for example, indicates that benefits of physical fitness such as muscle endurance and cardiovascular health will not be as present in a body that did not have as much rest.[10] Sleep deprivation and high prolonged stress can act as a barrier for healthy behavior. According to researcher Knutson and colleagues, lack of both sleep and rest results in both endogenous and exogenous factors. Lack of motivation to exercise or prepare food are such exogenous factors.[2,4]

The DGAG needs to hold some accountability for the 2010 edition by acknowledging the reality of the current situation. Society is becoming more demanding and more stressful everyday, resulting in less time spent on individual well-being needs including cautious nutritional decision making, engaging in physical activity, getting enough sleep and relaxation.[3] Lifestyle diseases and poor nutritional habits are becoming exceedingly prevalent amongst those

that also exhibit poor sleep habits and high stress lives. The DGAG should ensure to include language addressing this public health concern throughout the seventh version of the *Dietary Guidelines for Americans,* 2010 as well as include its own chapter alongside physical activity and a balanced diet.

References

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